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Rational Stubbornness?

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Professional forecasters may be reluctant to admit that their opinions have changed. Even if forecasters sole aim is to convince clients that they make accurate forecasts, this behavior may be rational. The pattern of forecasts may reveal valuable information about the forecasters even before the outcome is realised, for example able forecasters may revise forecasts less than less able forecasters. If so, rational forecasters would compromise between minimizing errors and mimicking prediction patterns typical of able forecasters.

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This note considers an advising game in which a professional advisor attempts to convince his client that his forecasts of a random variable are close to the outcome. This aim implies that, other things equal, the advisor will provide forecasts which he believes will be close to the outcome. In the example presented in this note, other things are not equal, and fully rational advisors choose to announce forecasts different from the conditional expected value of the variable to be predicted. In Nash equilibrium, advisors will provide their clients with forecasts which do not minimize forecast errors. The reason is that the pattern of forecasts of able and less able forecasters are different. This implies that even before the outcome is realized, clients have some information on the ability of forecasters. In the example presented in this note forecasters make two predictions of the same realization of a random variable. In Nash equilibrium, advisors who change their forecast by a smaller amount, have smaller forecast errors than advisors who change their forecasts by a larger amount.

This paper derives the implications of an advising game where advisors make many different forecasts of the same realization of the same variable. In this setting it can be possible to estimate an advisor's ability before the realization of the variable. Advisors who are concerned about their reputation when disclosing repeated forecasts to their clients will have other aims in addition to minimizing forecast errors. In this note, they do not want to deviate too much from the previous announcements. In which way advisors balance their joint objective to minimize forecasts errors and to look good before the outcome is observed depends on the specific model and the evaluation rule clients optimally employ in order to determine the ability of their advisors. In general strategic models of the interaction of professional advisors and their clients imply a bias in forecasts. In these models expected mean squared forecast errors can be reduced using informational available to the advisor when the forecast is made.

Additionally, the cross-sectional implications of the model make it possible to distinguish between rational cheating as implied by this and other advising games and behavioral models of predictable forecast errors [e.g. Kahneman et. al 1982]. In this model advisors announce biased forecasts because it makes them look good. Repeated forecasts of the same outcome are biased towards previous forecasts in the example presented in this paper. This prediction depends on the details of the model. However the general approach used implies that in this particular model client's must believe that advisors who change there forecasts by a small amount make good forecasts. In Nash equilibrium this belief must correspond to the objected expected value of the magnitude of forecast errors of an advisor conditional on the magnitude of the change in the advisor's forecast. According to the model advisors make forecasts biased towards their previous forecasts because advisors with small changes in forecasts have small forecast errors. Many strategic models imply that forecasts are biased in the direction which creates a pattern typical of able advisors. In the example discussed in this note, the pattern typical of able advisors is a small change in forecast from one period to the next. Many different patterns may be typical of able advisors, and a wide variety of examples of strategic bias can be developed.[Scharfstein and Stein 1990, Trueman 1988, Dow and Gorton 1994, Ehrbeck and Waldmann 1994]. Thus the hypothesis that forecasts are biased for strategic reasons does not imply a prediction of the direction of the bias. However the joint prediction about the bias in forecasts and the cross sectional pattern of forecast errors is quite robust. The general approach to explaining bias in forecasts used in this note and in Ehrbeck and Waldmann [1994,95] implies that forecasts are biased in a direction typical of able advisors, that is, advisors with small forecast errors.

The empirical results in [Ehrbeck 1993, Ehbeck and Waldmann 1994, 1995] reject the model of advice presented in this note. According to the model, mean squared second period forecast errors should be reduced if the forecast is changed to a forecast further from previous forecasts. In fact mean squared forecasts are reduced if the forecast is changed towards the previous forecasts. That is average forecast errors are reduced if if second period forecasts are replaced by a weighted average of first and second period forecasts.

The model also implies that advisors with high mean squared changes in forecasts have high mean squared forecast errors. This prediction is strongly confirmed [Ehrbeck and Waldmann 1995]. This means that the basic approach exemplified by the model in this note is invalid. It is easy to construct examples of advising games in which forecasts are biased away from previous forecasts [Ehrbeck and Waldmann 1995], but it is extremely difficult to reverse the (false) prediction that individual forecast errors would be reduced if forecasts were moved away from previous forecasts without reversing the (true) prediction that advisors with large mean squared changes in forecasts have large mean squared forecast errors. This means that the data reject the general approach to rationalizing biased forecasts and not narrow assumptions of this model or the examples presented in Ehrbeck and Waldmann [1994,95].

This paper has four sections the first of which is this introduction. Section two formalizes an example of the advising game and discusses testable implications. Section three briefly reviews the empirical evidence presented in Ehrbeck and Waldmann [1995]. Section four concludes.

II. A Model of Advice

Rational agents may choose to report public forecasts different from their subjective mean predictions, if honesty is not always the best policy. I assume that professional forecasters choose forecasts in order to convince clients that forecast errors are small. Clearly, this provides an incentive to report forecasts close to the forecaster's belief about the expected value of the variable forecasted. However , it also may create incentives to provide a pattern of forecasts which imply small expected forecast errors even before the outcome is observed. In this example, it is undesirable to admit that earlier forecasts were wrong This implies rational stubbornness, that is, advisors adjust their public forecasts too little in response to new information. This reasoning yields the simple prediction that forecast errors of advisors are negatively correlated with changes in forecasts. Rational clients, in turn, suspecting this, extrapolate changes in advisors' forecasts for their own use. In Nash equilibrium, clients do not make systematic forecast errors. The efforts of professional advisors to convince their clients that they have precise information does not cause systematic confusion. As in the signalling literature, many equilibria are possible. In this model a change of a stated forecast "means" that the forecasters' beliefs about the conditional mean of the forecasted variable have changed by a greater amount.

To formalize this idea, consider the following model. Let there be two agents in the following simple model of advice – an advisor and a client . The advisor provides the client with two predictions of the value of a random variable y. The client uses these stated predictions to form his own forecast of the value of the variable. The client also attempts to determine the quality of the forecaster's information analyzing the stated forecasts and the realized value of the predicted variable. If the client concludes that the forecaster has poor information, he terminates the relationship and looks for a new forecaster. If the client is not convinced that the forecaster has poor information, the game is repeated. The forecaster attempts to convince the client that he has high quality information. For simplicity, assume an forecaster who has no other aim.

In this game, it is assumed that the ith forecaster receives signal s_{1i} in period 1 then makes a forecast then receives signal s_{2i} in period 2 and makes another forecast. Finally the outcome y is realized.

Ehbeck and Waldmann present a simple example of an advising game in which there is a Nash equilibrium in which forecasters play pure strategies and in which more able forecasters are more willing than less able forecasters to admit that they were wrong.

Ehbeck and Waldmann [1994,5] argue that the Nash equilibrium in which the most able advisors are frank is focal. I will maintain the assumption that such Nash equilibria are focal throughout this note.

It is assumed that the i^{th} forecaster receives signals:

$$
\begin{aligned}
s_{1i} &= y + \epsilon_i + \eta_i \\
s_{2i} &= y + \epsilon_i
\end{aligned}
\tag{1}
$$

The expected value of y conditional on s_{ti} is equal to s_{ti}.

In the second period, the optimal forecast of y is s_2. There is no reason why the able forecaster would not frankly state his new prediction.

In the example in Ehrbeck and Waldmann [1994,95] it is assumed that that support of the distribution of η_i is $\pm\ \sigma_i$. This means that all able advisors always change their forecast by the same amount, and that any advisor who changes a forecast by a different amount reveal that they are not able. This is a weak point of the analysis in Ehrbeck and Waldmann [1994,95].

Below I relax the assumption that all able forecasters change forecasts by the same amount. To keep the notation simple assume that η_i and ϵ_i have the same distribution. It is possible to find Nash equilibria in which forecasters play pure strategies for a broad class of assumptions about this distribution. For other assumptions, no such equilibrium exists. Here I assume that η_i and ϵ_i are distributed with a density function described by equation (2)

$$\eta_i \sim \frac{1}{\sigma_i} h(\frac{\eta_i}{\sigma_i}) \tag{2}$$
$$\epsilon_i \sim \frac{1}{\sigma_i} h(\frac{\epsilon_i}{\sigma_i})$$

Where σ_i is a parameter which describes the quality of the signal. I assume that there are only two types of forecasters - some with $\sigma_i = 1$ and the rest with $\sigma_i = \sigma > 1$. To simplify notation, I suppress subscript i. I make fairly strong assumptions about h both to ensure tractability and to guarantee the existence of a Nash equilibrium in which forecasters play pure strategies. I assume that h has bounded support and so without loss of generality assume that

$$h(x) = 0 \quad if \quad |x| > 1 \tag{3}$$

I assume that h is symmetric and strictly concave and that for all x

$$\frac{|h'(x)|}{\sigma} < (h(1))^2 \tag{4}$$

To describe agents aims more precisely, I assume that if the posterior odds ratio that the forecaster is able is less than p_{min}, then the client terminates the relationship and looks for a new forecaster, and that if the posterior odds ratio is exactly p_{min}, the client is indifferent between keeping the current forecaster and looking for a new one. Clients are assumed to observe only the forecasts which they purchase and outcomes, so they choose a new forecaster at random. In principal, one could model the clients optimal decision process and derive p_{min}, but this would add unnecessary mathematics. Given the behavior of clients there are, in principal, three sorts of second period forecasts. Those which imply a posterior odds ratio less than p_{min} and loss of a client which will not occur in Nash equilibrium, those which imply a posterior odds ratio of more than p_{min} which will occur, and those which imply a posterior odds ratio of exactly p_{min} which will occur with positive probability. In Nash equilibrium a broad range of forecasts imply a posterior odds ratio of exactly p_{min} which makes it possible for one to consider clients' mixed strategies in which the probability of terminating the relationship is a freely chosen function of the change in forecast. This gives us a continuum of degrees of freedom and makes it possible to find a Nash equilibrium.

The forecasters are assumed to have infinite time preference and so to care only about whether the client terminates the relationship before paying for the next forecast. I only consider Nash equilibria in which able forecasters are frank. I then describe indirectly the optimal strategy for less able forecasters and derive an optimal mixed strategy for clients. Finally I check that the proposed strategies for both types of forecaster are optimal given such a strategy of clients.

First the optimal strategy of the less able forecaster is of the form given by equation (5)

$$\begin{aligned} f_1 &= s_1 \\ f_2 &= f_1 + g(s_2 - s_1) \end{aligned} \tag{5}$$

for some function g. This is clearly true because of the definitions of s_1 and s_2 and the symmetry of the distributions of η and ϵ.

As noted above, the analysis of the less able forecasters' strategies depends on the resulting clients' posterior odds ratio. If the change in signal ($s_2 - s_1 = -\eta$) is small the forecaster can be honest about this change without worrying about losing the client. In this case, the forecaster's only concern is that a second period forecast error greater than 1 in absolute value will imply loss of the client. Therefore, the forecaster announces $f_2 = s_2$ the forecast which minimizes this risk. For larger η, the forecaster will announce a forecast such that the posterior odds ratio is exactly p_{min}. Nash equilibrium g must be such that this occurs for a variety of values of η and resulting values of $f_2 - f_1 = g(s_2 - s_1)$. This makes it possible to choose the probability that the client terminates the relationship as a function of $f_2 - f_1$ in order to make the g optimal for the forecaster.

Assume that at the beginning of the period the client has a subjective odds ratio that the forecaster is able of p_{old}. Since p_{old} is based on previous rounds of play, equilibrium outcomes are a function of p_{old}. Clearly $p_{min} \leq p_{old}$ or else the client would have left already. For there to be a range of changes in forecast which leave the client indifferent whether to stay or leave g must be described by differential equation (8) and boundary conditions (6) and (7)

$$g(x) = x \text{ if } |x| \leq k \tag{6}$$

$$g(\pm\sigma) = 1 \tag{7}$$

$$\frac{p_{min}}{p_{old}} \frac{h(g^{-1}(x)/\sigma)}{\sigma g'(g^{-1}(x))} = h(x) \text{ if } k \leq |x| \leq \sigma \tag{8}$$

for k given by equation (9)

$$\frac{p_{min}}{p_{old}} \frac{\int_k^\sigma h(x/\sigma)dx}{\sigma} = \int_k^1 h(x)dx \tag{9}$$

The first boundary condition (6) is discussed at length below. The second boundary condition (7) notes that less forecasters will never change forecasts by more than 1 in either direction, as able forecasters never do so, and that they will change forecasts by exactly 1 in either direction with positive likelihood as able forecasters do so. The differential equation (8) states that for $k \leq (s_2 - s_1) \leq \sigma$ less able forecasters announce a forecast which causes clients to adjust their subjective odds ratio to exactly p_{min} so they are indifferent whether to leave or stay. The term on the right is the likelihood of observing a given change in forecast x if the forecaster is able. The term on the left is $\frac{p_{min}}{p_{old}}$ times the likelihood of observing that change in forecast if the forecaster is less able and uses g. Finally equation (9) describes k such that both boundary conditions hold. Since $p_{min} \leq p_{old}$ there is a unique positive k as described by equation (9). This, in turn, implies that there is a unique g which solves equations (8) (6) and (7) for k given by equation (9). Finally note that if $|x| \leq k$ then inequality (10) holds

$$\frac{p_{min}}{p_{old}} \frac{h(x/\sigma)}{\sigma} < h(x) \tag{10}$$

Note that equations (6) and (8) implies that g is monotonically increasing and differentiable and that its derivative is less than or equal to 1. For η close to zero the less able forecasters are frank. For larger η the less able forecasters are rationally stubborn.

I describe clients' behavior recalling that clients will not leave their forecaster if the posterior odds ratio of high ability to low ability is greater than p_{min} that they will leave if is less than p_{min} and that they might or might not leave if it is equal to p_{min}. The clients strategy is as follows. When f_2 is stated, if $|f_2 - f_1| > 1$ the client leaves, since able forecasters never change their forecast by more than 1. If $|f_2 - f_1| < k$ the client does not leave as there is insufficient evidence that the forecaster is less able. Call the probability that the client leaves after learning the second forecast $Q(|f_2 - f_1|)$. Inequality (10) implies that, if Q has the following properties then it is optimal for the client.

$$\begin{aligned} Q(x) &= 0 \quad if \quad x \leq k \\ Q(x) &= 1 \quad if \quad x > 1 \end{aligned} \tag{11}$$

In Nash equilibrium Q is monotonically increasing creating an incentive for rational stubbornness. Any function from $|f_2 - f_1| \in (k, 1)$ into the interval (0,1) is an equally good response for the client so we can choose it so as to make the stated strategies of forecasters optimal. When y is revealed clients leave if $|f_2 - y| > 1$, since able forecasters would never have such a large second period forecast error. Otherwise y provides evidence of high ability as the posterior odds ratio of able over less able increases. That is, any y such that $|f_2 - y| \leq 1$ is more likely to be observed if the forecaster is able than if the forecaster is less able. This is guaranteed by assumption (4) as revealed by a trivial application of the mean value theorem and the observation that $h(1) < 1$. As a result of their clients' strategies, both types of forecasters balance the risk that the client will leave them if the second forecast is too far from the first and the risk of a second period forecast error greater than 1 in absolute value. As assumed above, forecasters ignore any effect of their actions on the risk that the client leaves in subsequent periods.

Given the clients strategy it is clear that optimal $f_2 = s_2$ if $|s_2 - s_1| < k$. That is honesty is the best policy in this case since it does not cause summary termination as soon as the forecast is revealed and gives the best second period forecast errors. For $|s_2 - s_1| > k$, the first order condition for less able forecasters to maximize the probability of keeping their client is:

$$\frac{d}{df_2}[(1 - Q(f_2 - f_1))\int_{(f_2-s_2-1)}^{(f_2-s_2+1)}(h(\frac{x}{\sigma})/\sigma)dx] = 0 \tag{12}$$

at

$f_2 = s_1 + g(s_2 - s_1)$

At optimal f_2, the derivative of the log of the probability of keeping the client is also zero which implies equation (13)

$$\frac{h((g(s_2 - s_1) - s_2 + s_1 + 1)/\sigma) - h((g(s_2 - s_1) - s_2 + s_1 - 1)/\sigma)}{\int_L^U h(\frac{x}{\sigma})dx} + \frac{-Q'(g(s_2 - s_1))}{1 - Q(g(s_2 - s_1))} = 0 \tag{13}$$

for $L = g(s_2 - s_1) - s_2 + s_1 - 1$
and $U = g(s_2 - s_1) - s_2 + s_1 + 1$

Now without loss of generality consider the cases in which $s_2 > s_1$. This first order condition holds for a range of s_2 so the derivative of the first order condition with respect to s_2 is zero.

(14)

$$\frac{[-(1 - Q(g(s_2 - s_1)))Q''(g(s_2 - s_1)) - (Q'(g(s_2 - s_1)))^2]g'(s_2 - s_1)}{(1 - Q(s_2 - s_1))^2} + (g'(s_2 - s_1) - 1)\frac{(h'(\frac{U}{\sigma}) - h'(\frac{L}{\sigma}))(\frac{1}{\sigma})\int_L^U h(\frac{x}{\sigma})dx - (h(\frac{U}{\sigma}) - h(\frac{L}{\sigma}))^2}{(\int_L^U h(\frac{x}{\sigma})dx)^2} = 0$$

s_2 affects the first order condition in two ways. First s_2 affects f_2 giving terms in equation (14) which are multiples of $g'(s_2 - s_1)$. These terms also appear without the factor $g'(s_2 - s_1)$ in the second derivative with respect to f_2 of the probability of keeping the client. In addition s_2 directly gives the -1 in the term $(g'(s_2 - s_1) - 1)$ in equation (14). This direct effect of s_2 does not appear in the second derivative with respect to f_2 of the log of the chance of keeping the client. The assumption that h is concave implies that $(h'(\frac{U}{\sigma}) - h'(\frac{l}{\sigma}))$ is negative so inequality (15) the second order condition for a maximum holds

$$\text{(15)} \qquad \frac{[-(1-Q(g(s_2-s_1)))Q''(g(s_2-s_1)) - (Q'(g(s_2-s_1)))^2]}{(1-Q(s_2-s_1))^2} +$$

$$\frac{(h'(\frac{U}{\sigma}) - h'(\frac{L}{\sigma}))(\frac{1}{\sigma})\int_L^U h(\frac{x}{\sigma})dx - (h(\frac{U}{\sigma}) - h(\frac{L}{\sigma}))^2}{(\int_L^U h(\frac{x}{\sigma})dx)^2} < 0$$

Therefore, the forecaster's strategy g maximizes the chance of keeping the client if the client uses strategy Q. Given the broad range of allowed clients' strategy functions Q, equation (12) and (13) simply define the clients strategy Q.

Finally assumption (4) guarantees that it is indeed optimal for the able to be frank as assumed. The risk of losing a client immediately after announcing f_2 is, for all forecasters, the same function (Q) of the change in forecast so able forecasters have an incentive to announce f_2 close to f_1. However, honesty ($f_2 = s_2$) is the best policy for the able as it guarantees with probability 1 a second period forecast error less than 1 in absolute value. The probability of a second period forecast error less than 1 in absolute value decreases at rate $h(1 - |f_2 - s_2|)$ as f_2 moves away from s_2, so the log of the probability of a second period forecast error less than one in absolute value decreases at rate $h(1)$ for small deviations from $f_2 = s_2$. Assumption (4) Implies that this is greater than the rate of decrease of the log of this probability for the less able, as is shown by applying the mean value theorem separately to the numerator and denominator of the first term in the sum on the left of equation (13) and recalling that if $|x| < 1$ then $h(x) > h(1)$. The less able are indifferent about small changes in f_2 or strictly prefer to be frank, so the able strictly prefer to be frank. This means that the Nash equilibrium in which forecasters play pure strategies and able forecasters are frank has been found for a broad class of advising games.

While I do not provide a closed form for the Nash equilibrium in which forecasters play pure strategies and in which able forecasters are frank, one can derive testable implications.

First Nash equilibrium g is continuous. Second, g is one to one, since if the same $f_2 - f_1$ were chosen for two different $s_2 - s_1$, the first term in the sum on on the left hand side of (13) would be different and the second term would be equal. Since g is continuous and one to one it is monotonic. As described by equation (8) $s_2 - s_1$ is a mean preserving spread of $g(s_2 - s_1)$. The first order condition, equation (12) or (13) clearly implies that $g(s_2 - s_1)$ and $s_2 - s_1$ have the same sign. Together these observations imply that the expected value of the regression coefficient of $f_2 - y$ on $f_2 - f_1$ is negative. This is the first testable prediction.

Second, equation (8) implies that the variance of $(f_2 - f_1)$ is greater for less able forecasters than for able forecasters. Clearly expected squared forecast errors are greater for less able forecasters. They would be greater even if less able forecasters minimized mean squared forecast errors, and less able forecasters do not minimize mean squared forecast errors in Nash equilibrium. Therefore, across forecasters, mean squared changes in forecasts are positively correlated with mean squared forecast errors. This is the cross sectional prediction.

Thus the model gives two apparently contradictory predictions – each individual less able forecaster changes his forecast too little to minimize expected squared errors, yet comparing different forecasters those with larger expected squared changes in forecasts have larger expected squared forecast errors. The reason for these two predictions is very simple. Less able forecasters balance their desire to have small changes in forecasts like able forecasters and their desire to have small forecast errors like able forecasters.

This simple argument is likely to apply to a broad class of models including the example discussed in this paper. The logic of rational cheating is the same for a variety of models. This implies a fairly strong prediction. – that forecasts are biased in a direction which creates a pattern of forecasts typical of able advisor. Ehrbeck and Waldmann [1995] discuss a variety of different models which do not imply rational stubbornness. In each case there is an implication that changes in second period forecasts which reduce second period forecast errors make the pattern of first and second period forecasts look more like the pattern of forecasters who make poor predictions. This general prediction makes models of rational cheating of the type discussed in this note, distinguishable from behavioral models of predictable forecast errors [Andreasson 1987, Andreasson 1990, Andreasson and Kraus 1990, De Bondt and Thaler 1990, Eirhorn and Hogarth 1978, Grether 1980, Kahneman et. al 1982]. If the bias in forecasts were due to less than full rationality, one could easily obtain the opposite prediction. If forecasters have a behavioral bias and some have a larger bias than others, one would expect (other things equal) that the forecasts with the larger bias would have larger mean squared forecast errors. This is the opposite of the pattern implied by the model presented above and implies that the evidence reported in Ehbeck and Waldmann [1995] rejects this model, and indeed this general approach to rationalizing biased forecasts against the alternative behavioral models.

III. The Model is False

This section is very brief because it is entirely devoted to a review of the results in Ehrbeck and Waldmann [1995]. Ehbeck and Waldmann [1995] use a data from the North Holland *Economic Forecast* monthly newsletter in which identified forecasters make several predictions of the value of some economic variable for the same target period. The prediction variable used by Ehrbeck and Waldmann [1995] is the forecast of the annualized discount rate on new issues of 91-day US-Treasury Bills, based on weekly auction average rates. Each month the panel of experts submits predictions of the average interest rate for the quarters of the calendar year. The forecast data have consequently been split in three, small homogeneous panels of first month, second month, and third month forecasts respectively. Realization data come from the *Federal Reserve Bulletin*. Quarterly averages of discount rates are calculated as the simple average of the monthly data which are quoted on an annualized discount basis. For a complete description of the data see Ehrbeck [1993] and Ehrbeck and Waldmann [1994,5]. Ehbeck and Waldmann [1995] report that forecast errors are positively correlated with changes in forecast. The model presented above implies a null hypothesis that forecast errors are not positively correlated with changes in forecast. This null is overwhelmingly rejected. A number of different estimates of t-like statistics are significantly positive. These include statistics which are extremely robust [Ehbeck and Waldmann 1995]. Thus the model presented above is false.

In contrast the cross-sectional prediction of the model of rational stubbornness is strongly confirmed. Across forecasters large mean squared forecast errors are strongly positively correlated with large second period forecast errors. Both the correlation and the rank correlation are strongly statistically significant [Ehrbeck and Waldmann 1995]. This result is even more problematic for strategic models of bias than the rejection of the model of rational stubbornness is. It is easy to find examples of strategic bias such that forecast errors are positively correlated with changes in forecasts [Ehrbeck and Waldmann 1995]. It is extremely difficult to find a model of strategic bias which (correctly) implies that forecaster errors are positively correlated with changes in forecasts and that advisors with larger mean squared changes in forecasts have larger mean squared forecast errors. Together the estimates of bias and the cross sectional result imply that some forecasters hurt themselves twice by changing their forecasts too much – first because this creates large changes in forecast which are typical of advisors with large second period forecast errors and second because this creates larger mean squared forecast errors than would result if the forecast had been closer to the older forecast.

It is possible to understand this pattern using a behavioral model of bias. For example, forecasters might put too little weight on their past forecast, because they are sincerely overestimate the importance of new information, because it is more salient. If the degree of salience bias varies across forecasters, then other things equal (or uncorrelated) one would expect the more overconfident forecasters to announce forecasts further from the lagged average and further from the truth.

IV. Conclusion

In this note a model of strategic bias in forecasts is developed and tested. Unlike other models of strategic bias [Scharfstein and Stein 1990, Ehrbeck and Waldmann 1994,5] a Nash equilibrium of the advising game can be found for a variety of distributions of disturbances. This makes it possible to make relatively firm predictions. In particular the model makes it clear how a broad class of strategic models of bias imply predictions about the bias in forecasts and the pattern of forecasts across advisors. In the model presented here and in many such models, forecasts are biased in the direction which creates a pattern typical of able advisors. This occurs because less able advisors balance their desires to minimize forecast errors and to create a pattern of forecasts typical of able advisors. In Nash equilibrium, clients will use both the final forecast error and the pattern of forecasts in order to evaluate their advisor.

The specific model presented here implies predictions which are strongly rejected by the data. More importantly, the data reject the prediction that forecasts are biased in a direction which creates a pattern of forecasts typical of advisors with small forecast errors [Ehrbeck and Waldmann 1995]. It is extremely difficult to reconcile these results with strategic models of bias. In contrast the empirical results are consistent with behavioral models of bias.

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